

## ADDING + SUBTRACTING RATIONALS CONT'D

Ex. 1:  $\frac{6}{x+2} - \frac{x+4}{x+2}$

$$= \frac{6(x+2)}{(x-2)(x+2)} - \frac{(x+4)(x-2)}{(x-2)(x+2)}$$

$$= \frac{6(x+2) - (x+4)(x-2)}{(x-2)(x+2)}$$

$$= \frac{6x+12 - (x^2 - 2x + 4x - 8)}{(x-2)(x+2)}$$

$$= \frac{6x+12 - x^2 - 2x + 8}{(x-2)(x+2)}$$

$$= \frac{-x^2 + 4x + 20}{(x-2)(x+2)}$$

- $x \neq \pm 2$   
LCD:  $(x+2)(x-2)$
- 1) make a common denominator
  - 2) NPUS
  - 3) put them together
  - 4) simplify / foil
  - 5) distribute the -
  - 6) simplify + combine like terms
  - 7) factor / simplify if possible.

Ex. 2:  $\frac{y^2-20}{y^2-4} + \frac{y-2}{y+2}$

$$= \frac{y^2-20}{(y-2)(y+2)} + \frac{(y-2)(y+2)}{(y+2)(y+2)}$$

$$= \frac{y^2+20 + y^2-4y+4}{(y-2)(y+2)}$$

$$= \frac{2y^2-4y-16}{(y-2)(y+2)}$$

$$= \frac{2(y+2)(y-4)}{(y-2)(y+2)}$$

$$= \frac{2(y-4)}{y-2}$$

$y \neq \pm 2$

Ex. 3:  $\frac{1}{x-\frac{1}{x}} + \frac{1}{\frac{1}{2x} + \frac{1}{x}}$

$$= \frac{\frac{x+1}{x} \cdot \frac{x}{x}}{\frac{x^2-1}{x} \cdot \frac{x}{x}} + \frac{\frac{x}{x} \cdot \frac{x}{x}}{\frac{x^2-1}{x} \cdot \frac{x}{x}}$$

$$= \frac{x+1}{x^2-1} + \frac{x}{x^2-1}$$

$$= \frac{x+1+x}{(x+1)(x-1)}$$

$$= \frac{1}{x-1}$$

$x \neq 0, \pm 1$

- 1) give every term a common denominator.
- 2) multiply top + bottom by LCD  $\rightarrow (x)$
- 3) simplify
- 4) factor if possible
- 5) simplify

Ex. 4:  $2 - \frac{4}{y}$

$$= \frac{y}{y} - \frac{4}{y}$$

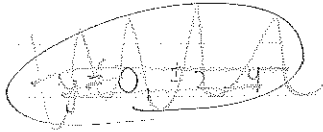
$$= \frac{y-4}{y}$$

$$= \frac{y-4}{y^2-4}$$

$$= \frac{2(y-2)}{(y-2)(y+2)}$$

$$= \frac{2}{y+2}$$

LCD = y



Ex. 5:  $\frac{2x}{x^2+x-6} - \frac{x-8}{x^2-5x-24}$

$$= \frac{2x}{(x-2)(x+3)} - \frac{x-8}{(x+8)(x+3)}$$

$$= \frac{2x}{(x-2)(x+3)} - \frac{(x-2)}{(x+3)(x-2)}$$

$$= \frac{2x}{(x-2)(x+3)} - \frac{x+2}{(x-2)(x+3)}$$

$$= \frac{x+2}{(x-2)(x+3)}$$

$x \neq -3, 2, 8$

LCD =  $(x-2)(x+3)$